



Enabling a New World of Mobile Internet Computing

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A Convergence of Technologies is Changing Computing

The Internet

- email
- web sites

Wireless

Crusoe Processors

Windows & Linux

Mobile access

Notebooks
&
Internet Appliances

Mobile
Internet
Computing

Using History to Predict the Future: The Telephone

1960's

- Every home has a telephone
- Wired to fixed location in the home
- Worldwide direct dialing
- People go to phone



1990's

- Wireless and long battery life
- Every person has a mobile phone
- Anywhere anytime access
- Considered essential tool



Predicting the Future of the Computer

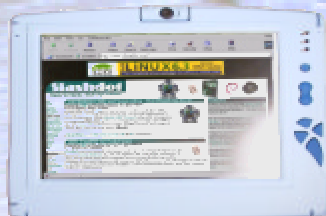
1990's

- Every home has a computer
- Wired to fixed location in the home
- Worldwide Internet access
- People go to computer



2000's

- Wireless and long battery life
- Every person has a mobile computer
- Anywhere anytime Internet access
- Considered essential tool





But if the future is so obvious, why . . .

Why are notebook PCs so heavy?

Why is battery life so short?

Why are notebook computers so noisy?

Why can't a handheld . . .

- **Use the same browser as my PC?**
- **Use the same email as my PC?**
- **And open PowerPoint and Excel email attachments?**

Because the right microprocessor didn't yet exist

We Invented Crusoe

**The first
microprocessor
whose instruction set
is implemented entirely with
SOFTWARE**

Crusoe Technology

Crusoe is the sum of

Code Morphing Software

+



=

Code Morphing Software

- ✍ Provides Compatibility
- ✍ Translates the 1's and 0's of x86 instructions to equivalent 1's and 0's for a simple VLIW processor
- ✍ Learns and improves with time

$\frac{3}{4}$

+

VLIW Hardware

- ✍ 128-bit Very Long Instruction Word processor
- ✍ Simple and fast
- ✍ Fewer transistors

$\frac{1}{4}$

Low Power

x86 PC Compatibility

PC Performance

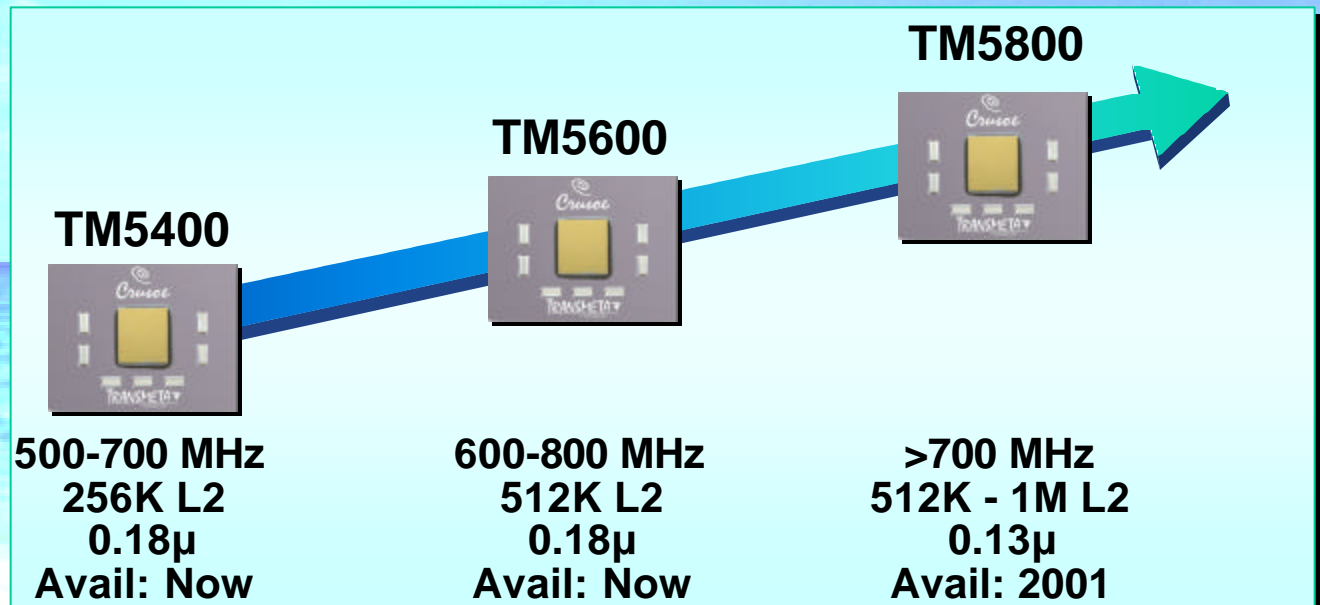
Advantages of a Software Based Microprocessor

A 2-part software/hardware solution has many benefits

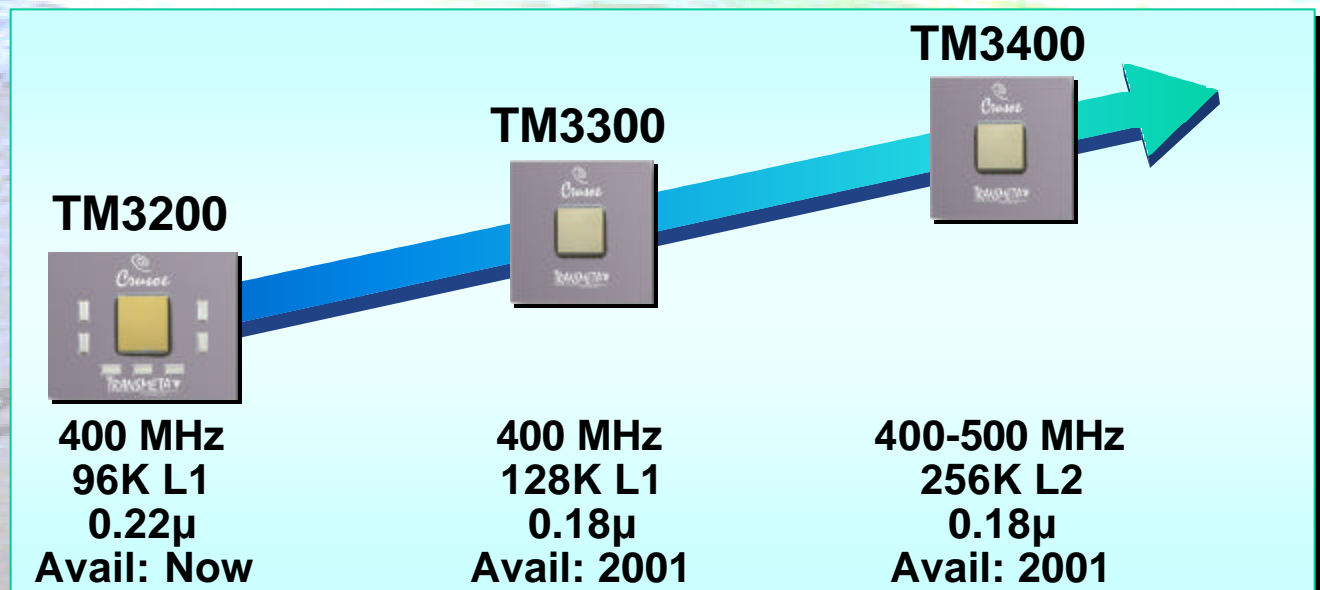
- **Simpler hardware chips**
- **Simpler chips are easier to design and debug**
- **Smaller design teams with shorter design times**
- **Fundamental manufacturing cost advantage**
- **Software is upgradeable over the Internet**
- **Simpler chips would run cooler**

Crusoe Processor Roadmap

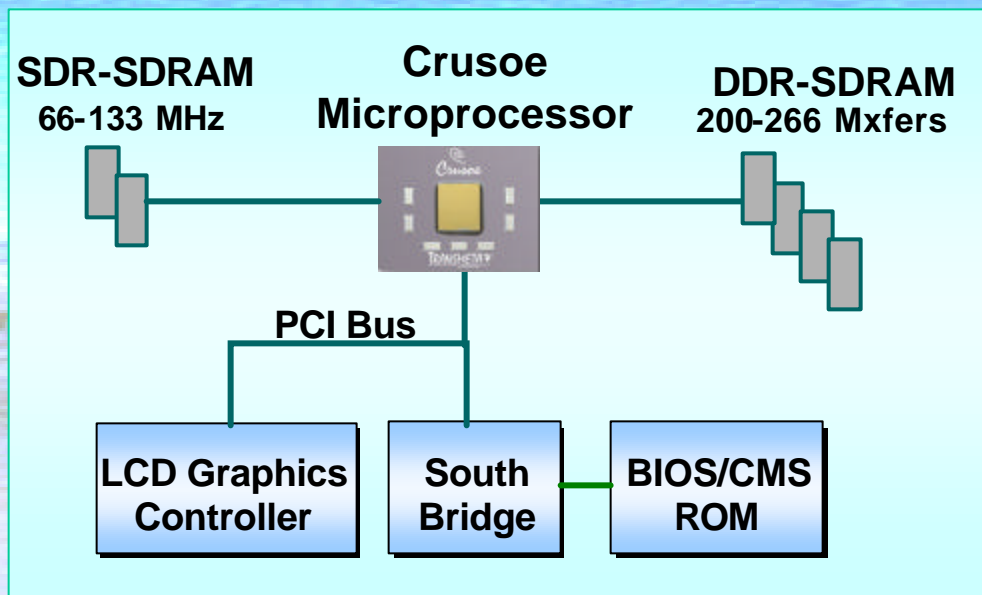
For light weight
Notebook Computers
running
Microsoft Windows



For
Internet Appliances
running
Mobile Linux



Highly Integrated Crusoe Solution



Crusoe Includes

VLIW Processor

PCI Bus Interface

PC133 SDRAM Interface

DDR DRAM Interface

- Twice the speed
- Lower power DRAM

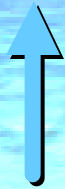
LongRun Power Management

Integration reduces two chips into one

- PC board space is a critical resource
- Further reduces power (no CPU bus)

How Crusoe Saves Power

$$\text{Power} = \text{Capacitance} \times \text{Frequency} \times (\text{Voltage})^2$$



Related to number
of logic transistors

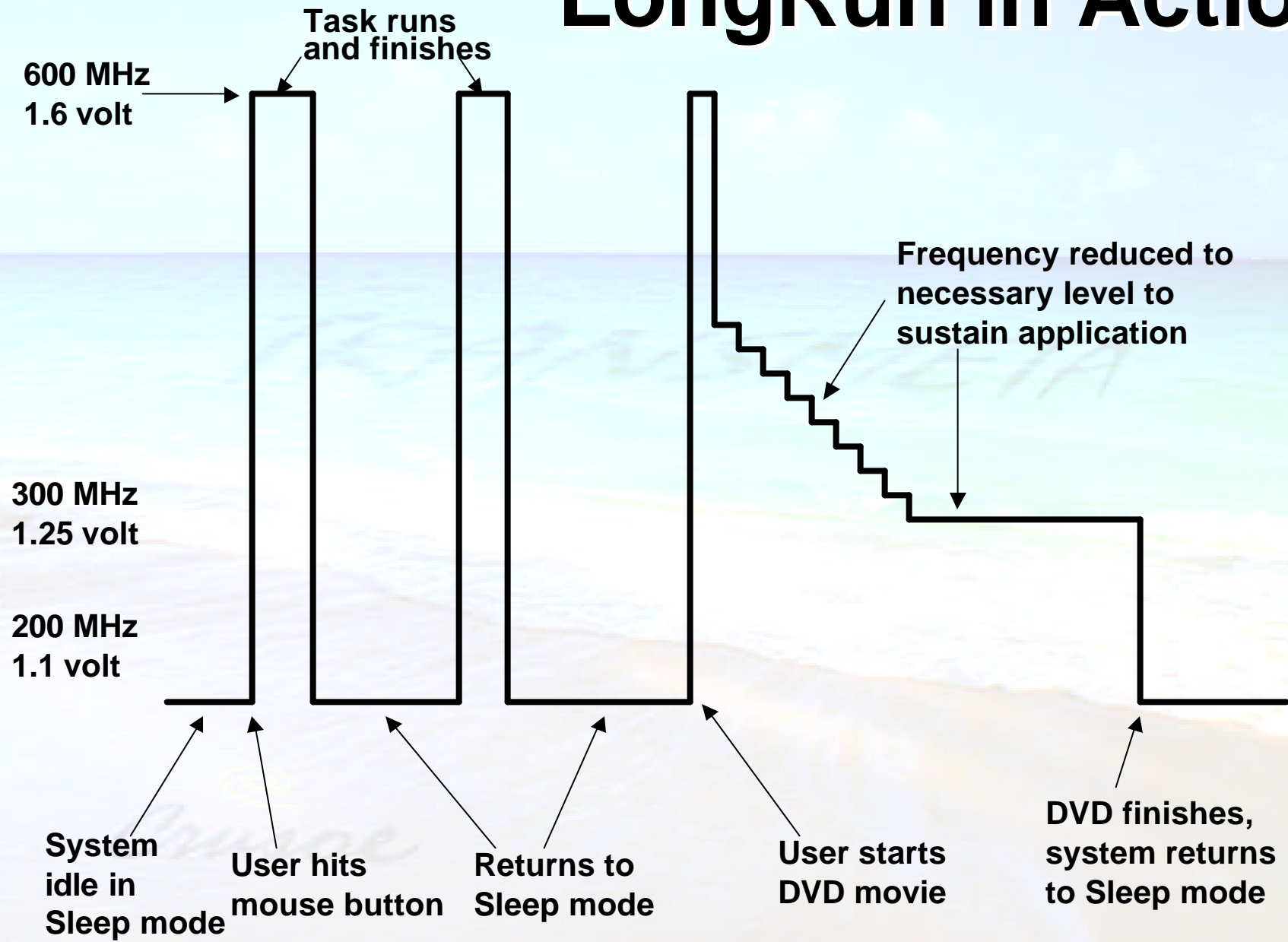
Crusoe has fewer
transistors due to
the software approach



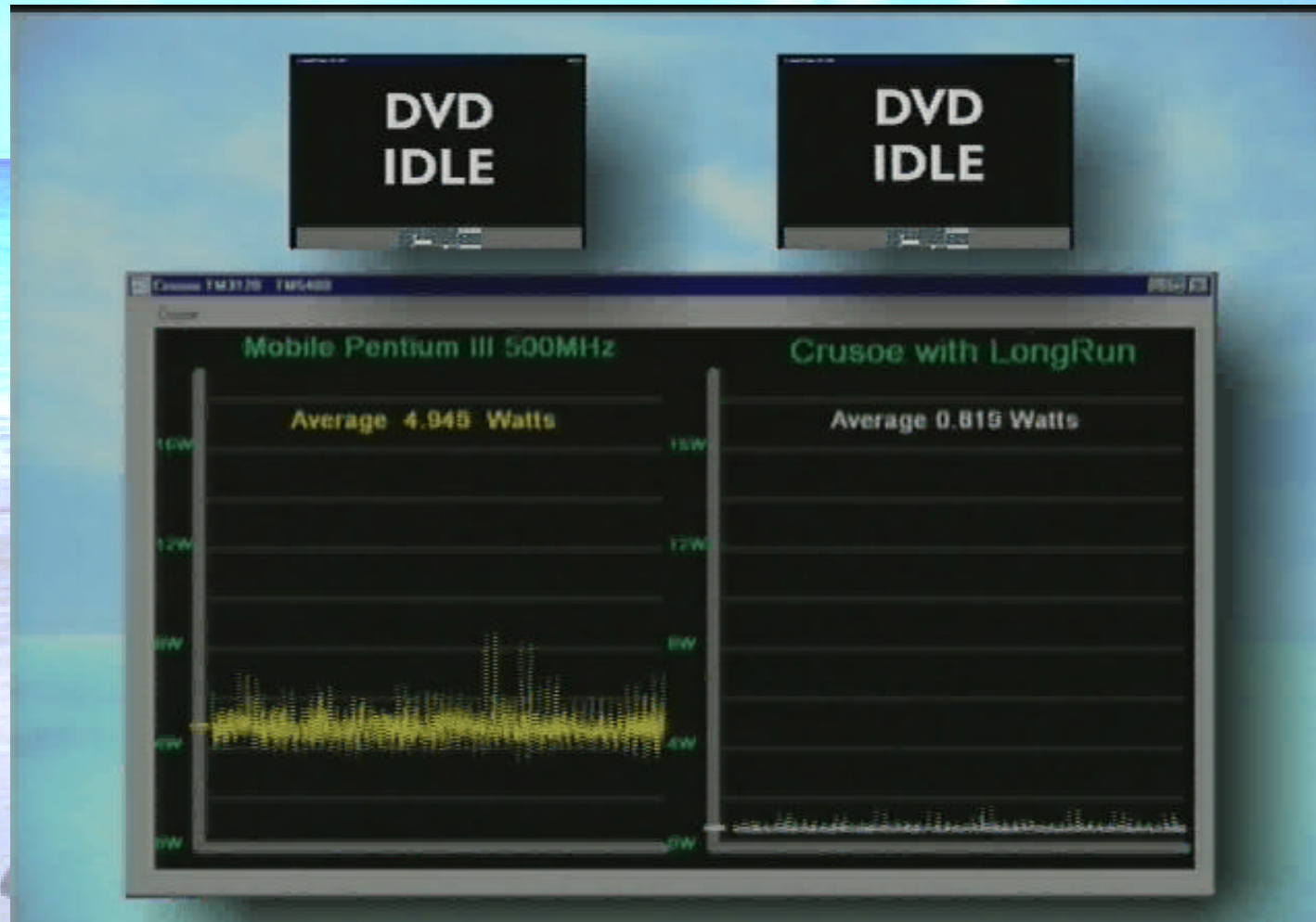
LongRun can
dynamically adjust both
only because of
Code Morphing Software

***Code Morphing Software is the key
enabler that others don't have***

LongRun in Action



LongRun Power Management



**Mobile Pentium III
500 MHz**

**Crusoe with
LongRun**

A photograph of a beach scene. The sky is a clear, vibrant blue with a few wispy white clouds. The ocean is a deep blue, with white foam from waves breaking onto the shore. The sand is a light, golden-brown color. In the water, the word "TRANSMETA" is written in large, dark, capital letters. On the sand, the word "Crusoe" is written in a cursive script, with a small yellow spiral drawn above the letter 'C'.

Notebooks

SONY®

Sony Picturebook Model C1VN with 600 MHz Crusoe TM5600



- **Announced** September 8, 2000
- **Weight** 2.2 lbs
- **Battery life** up to 5 hours
- **Quotes** “Crusoe doubled battery life”

FUJITSU



Fujitsu Biblo Loox S
with TM5400 533 MHz Crusoe

One spindle Windows notebook

- ✍ **Announced** September 25, 2000
- ✍ **Weight** 2.2 lbs
- ✍ **Battery Life** 8 hours
- ✍ **Wireless** 64Kb to Internet



Fujitsu Biblo Loox T
with TM5600 533 MHz Crusoe

Two spindle Windows DVD notebook

- ✍ **Announced** September 25, 2000
- ✍ **Weight** 3.5 lbs
- ✍ **Battery Life** 7.3 hours
- ✍ **Wireless** 64Kb to Internet

HITACHI

FLORA 220 TX



**One spindle
with Crusoe TM5400**



**Two spindle CDROM
with Crusoe TM5600**



**Two spindle DVD
with Crusoe TM5600**

Crusoe

- Announced
- Weight
- Battery Life
- Feature

September 27, 2000

3.5 lbs

Over 10 hours

Thinnest DVD notebook

SONY®

October 16



A Sony Corporation employee shows off the new personal Web-broadcasting laptop, the VAIO GT (PCG-GT1), at an unveiling in Tokyo October 16, 2000. The laptop comes with a video camcorder attached to the side. The video lens and display rotate 180 degrees, and users can shoot and send video images to the Internet. The laptop is expected to cost about \$2,784.

NEC



NEC LaVie MX
600 MHz TM5600
20 GB disk

- **Announced**
- **Weight**
- **Battery life**
- **New**

October 17, 2000

~3 lbs

11 hours

Low power LCD panel

CASIO - Cassiopeia FIVA



Shown at Comdex

- **600 MHz TM5600**
- **0.8 inch thick**
- **2 pounds**
- **9 hours battery life**